Hall Ticket No | | | | | | | | | | | Question Paper Code: CMB011

MBA III Semester End Examinations (Regular) - January, 2018

**Regulation: .–R16**

**Quantitative Analysis for Business Decisions**

**(MASTER OF BUSINESS ADMINISTRATION)**

**Time: 3 Hours** **Max Marks: 70**

**Answer ONE Question from each Unit**

**All Questions Carry Equal Marks**

**All parts of the question must be answered in one place only**

## UNIT – I

1. (a) Explain the various applications of operation research . [7M]
   (b) Explain the advantages of operation research along with its limitations [7M]
2. (a) Explain the origin of operation research in brief. [7M]
   (b) Explain different techniques of operation research. [7M]

## UNIT – II

3. (a) The agricultural research institute suggested the farmer to spread out atleast 4800 kg of special phosphate fertilizer and not less than 7200 kg of a special nitrogen fertilizer to raise the productivity of crops in his fields. There are two sources for obtaining these – mixtures A and mixtures B. Both of these are available in bags weighing 100 kg each and they cost Rs.40 and Rs.24 respectively. Mixture A contains phosphate and nitrogen equivalent of 20 kg and 80 kg respectively, while mixture B contains these ingredients equivalent of 50 kg each. Write this as an LPP and determine how many bags of each type the farmer should buy in order to obtain the required fertilizer at minimum cost. [7M]
   (b) Solve the following LPP by graphical method [7M]
   Maximize $Z = 5X_1 + 3X_2$
   Subject to constraints
   $2X_1 + X_2 \leq 1000$
   $X_1 \leq 400$
   $X_1 \leq 700$
   where $X_1, X_2 \geq 0$.
4. (a) Write the Dual of the following LPP [7M]
   MIN $Z = 2X_2 + 5X_3$
   $X_1 + X_2 \geq 2$
   $2X_1 + X_2 + 6X_3 \leq 6$
   $X_1 - X_2 + 3X_3 = 4$
   where $X_1, X_2, X_3 \geq 0$.

(b) A distribution system has the following constraints. [7M]

| Factory | capacity (in units) |
|---|---|
| A | 45 |
| B | 15 |
| C | 40 |
| Warehouse | Demand (in units) |
| I | 25 |
| II | 55 |
| III | 20 |

The transportation costs per unit( in rupees) allocated with each route are as follows

| To/From | I | II | III |
|---|---|---|---|
| A | 10 | 7 | 8 |
| B | 15 | 12 | 9 |
| C | 7 | 8 | 12 |

Find the optimum transportation schedule and the minimum total cost of transportation.

## UNIT – III

5. (a) Explain the steps in Hungarian method in detail. [7M]

(b) Solve the following assingment problem with maximization objective. [7M]

| Salesmen | D1 | D2 | D3 | D4 | D5 |
|---|---|---|---|---|---|
| S1 | 40 | 46 | 48 | 36 | 48 |
| S2 | 48 | 32 | 36 | 29 | 44 |
| S3 | 49 | 35 | 41 | 38 | 45 |
| S4 | 30 | 46 | 49 | 44 | 44 |
| S5 | 37 | 41 | 48 | 43 | 47 |

6. (a) Explain step wise procedure to solve the unbalanced assignment problem. [7M]

(b) A company has taken the third floor of a multi-stair building for rent with a view to locate one of their zonal offices. There are five main rooms in this to be assigned to five managers. Each room has its own advantages and disadvantages. Some have windows, some are closer to the wash rooms or to the canteen or secretarial pool. The rooms are of all different sizes and shapes. Each of the five managers were asked to rank their room preference amongst the rooms 301, 302, 303, 304 and 305. Their preferences were recorded in a table as indicated below [7M]

| M1 | M2 | M3 | M4 | M5 |
|---|---|---|---|---|
| 302 | 302 | 303 | 302 | 301 |
| 303 | 304 | 301 | 305 | 302 |
| 304 | 305 | 304 | 304 | 304 |
| - | 301 | 305 | 303 | - |
| - | - | 302 | - | - |

Most of the managers did not list all the five rooms since they were not satisfied with some of these rooms and they have left these from the list. Assuming that their preferences can be quantified by numbers, find out as to which manager should be assigned to which room so that their total preference ranking is a minimum.

## UNIT – IV

7. (a) What are decision trees? What are the different components of decision trees. How do you analyze them. [7M]

(b) Solve the following using Min-Max regret criterion values given in Lakhs. [7M]

| Nature Strategies | N1 | N2 | N3 |
|---|---|---|---|
| S1 | 7 | 3 | 1.5 |
| S2 | 5 | 4.5 | 0 |
| S3 | 3 | 3 | 3 |

8. (a) Discuss the various types of decision making environments in detail along with different decision making techniques [7M]

(b) The following information available related to a goods transport system. Lorries have fixed cost of Rs. 90/- per day and variable cost of Rs.200. If the lorry owner has 4 vehicles, what are its daily expectations? If he starts a new business without any lorries how many lorries he has to buy? [7M]

| Number of lorries in demand | 0 | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|
| Probability | 0.1 | 0.2 | 0.3 | 0.2 | 0.2 |

## UNIT – V

9. (a) What are the various assumptions of single queue and single server model. **[7M]**

   (b) Customers arrive at a one-window drive-in bank according to a Poisson distribution with mean 10 per hour. Service time per customer is exponential with mean 5 minutes. The space in front of the window including that for the serviced car accommodate a maximum of 3 cars. Other cars can wait outside the space. Calculate **[7M]**

      i. What is the probability that an arriving customer can drive directly to the space in front of the window.

      ii. What is the probability that an arriving customer will have to wait outside the indicated space

      iii. How long is arriving customer expected to wait before stating the service.

      iv. How many spaces should be provided in front of the window so that all the arriving customers can wait in front of the window at least 20% of the time.

10. (a) Explain the applications of queuing models in detail. **[7M]**

   (b) Customers arrive at the first class ticket counter of a theatre at a rate of 12 per hours. There is one clerk serving the customers at a rate of 30 per hour. Assuming the conditions for use of the single channel queuing model, Evaluate **[7M]**

      i. The probability that there is no customer at the counter (i.e. that the system is idle)

      ii. The probability that there are more than 20 customers at the counter

      iii. The probability that there is no customer waiting to be served

      iv. The probability that a customer is being served and no body is waiting.